Spot Safety Project Evaluation

Project Log # 200512155

Spot Safety Project # 05-00-201

Spot Safety Project Evaluation of the Traffic Signal Installation At the Intersection of SR 1009 (Lake Wheeler Rd) and Sierra Dr Wake County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 11/21/2006
Brad Robinson, EI Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-00-201 – The Intersection of SR 1009 (Lake Wheeler Rd) and Sierra Dr. in Wake County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a traffic signal. SR 1009 (Lake Wheeler Rd) and Sierra Dr. are both 2-lane roads with no turn lanes and speed limits of 45 mph and 35 mph, respectively, in the study area. The subject location is a four-leg intersection, which was controlled by stop signs on Sierra Dr in the before period.

The original statement of problem was that vehicles on Sierra Dr. could not safely cross or enter the intersection due to insufficient gaps in traffic. A citizen originally submitted a request for the initial study. The intersection was found to have met Traffic Signal Volume and Delay Warrants 2, 9, and 11.

The initial crash analysis was completed from November 1, 1996 to October 31, 1999 with 22 reported crashes, including 13 that were considered correctable by the chosen countermeasure. The correctable crashes included ten Angle Crashes and three Left Turn-Different Roadway Crashes. The final completion date for the improvement at the subject intersection was on December 19, 2000 with a total cost of $45,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 2000 to January 31, 2001. The before period consisted of reported crashes from July 1, 1995 through October 31, 2000 (5 years and 4 months) and the after period consisted of reported crashes from February 1, 2001 through May 31, 2006 (5 years and 4 months). The ending date for this analysis was determined by the available crash data at the time the analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle. One Ran-Off-Road Crash was included as a target crash in the before period that involved a driver swerving to avoid a Frontal Impact Crash.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	29	25	-13.8
Total Severity Index	6.17	4.55	-26.3
Target Crashes	18	6	-66.7
Target Crash Severity Index	8.91	4.7	-47.3
Volume	14,000	16,700	19.3
Injury Summary			
Fatal injuries	0	0	N/A
Class A injuries	2	0	-100.0
Class B injuries	5	3	-40.0
Class C Injuries	22	20	-9.1
Total Injuries	29	23	-20.7

The naive before and after analysis at the treatment location resulted in a 14 percent decrease in Total Crashes, a 67 percent decrease in Target Crashes, a 26 percent decrease in the Total Severity Index, and a 19 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1998 and the after period ADT year was 2003.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 14 percent decrease in Total Crashes and a 67 percent decrease in Target Crashes, with a 19 percent increase in ADT. The Total Severity Index decreased by 26 percent and the Target Crash Severity Index decreased by 47 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

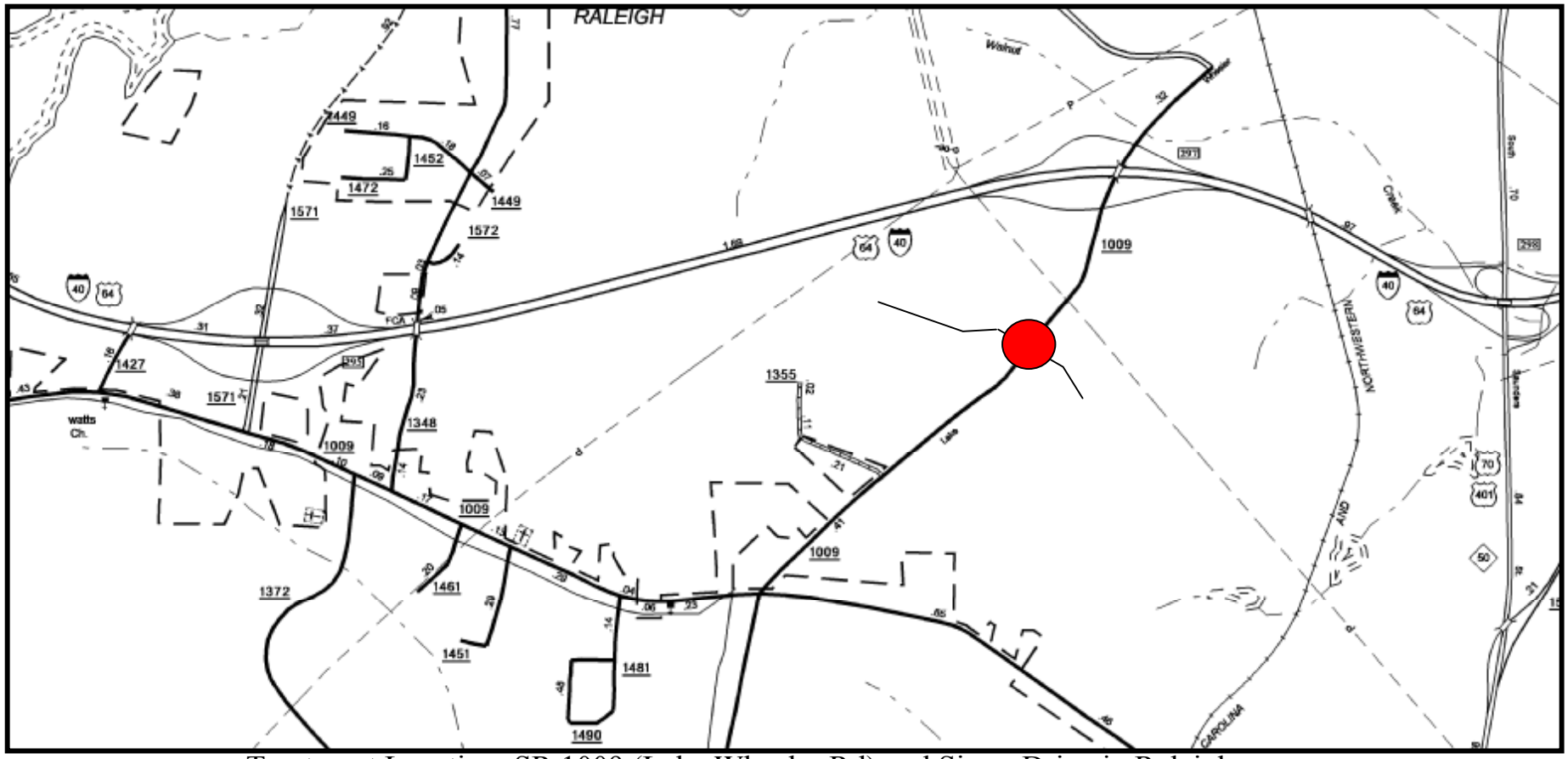
Referencing the *Collision Diagram, Before Period*, there was a pattern of Frontal Impact crashes between vehicles entering the intersection from the northwest leg of Sierra Dr and vehicles on Lake Wheeler Rd. This pattern decreased by 81% (from 11 to 2) after the signal was installed. There was also a pattern of crashes between vehicles entering the intersection from the southeast leg of Sierra Dr. and vehicles on Lake Wheeler Rd., which decreased by 80% (from 5 to 1).

Again referencing the *Collision Diagrams*, Rear-End Crashes involving vehicles traveling southwest on Lake Wheeler Rd increased by 300% (from 1 to 4), although total Rear-End Crashes involving vehicles approaching the intersection only increased 80% (from 5 to 9).

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Wake County
Evaluation of Spot Safety Project #05-00-201



Treatment Location: SR 1009 (Lake Wheeler Rd) and Sierra Drive in Raleigh

Treatment Site Photos Taken October 11, 2006

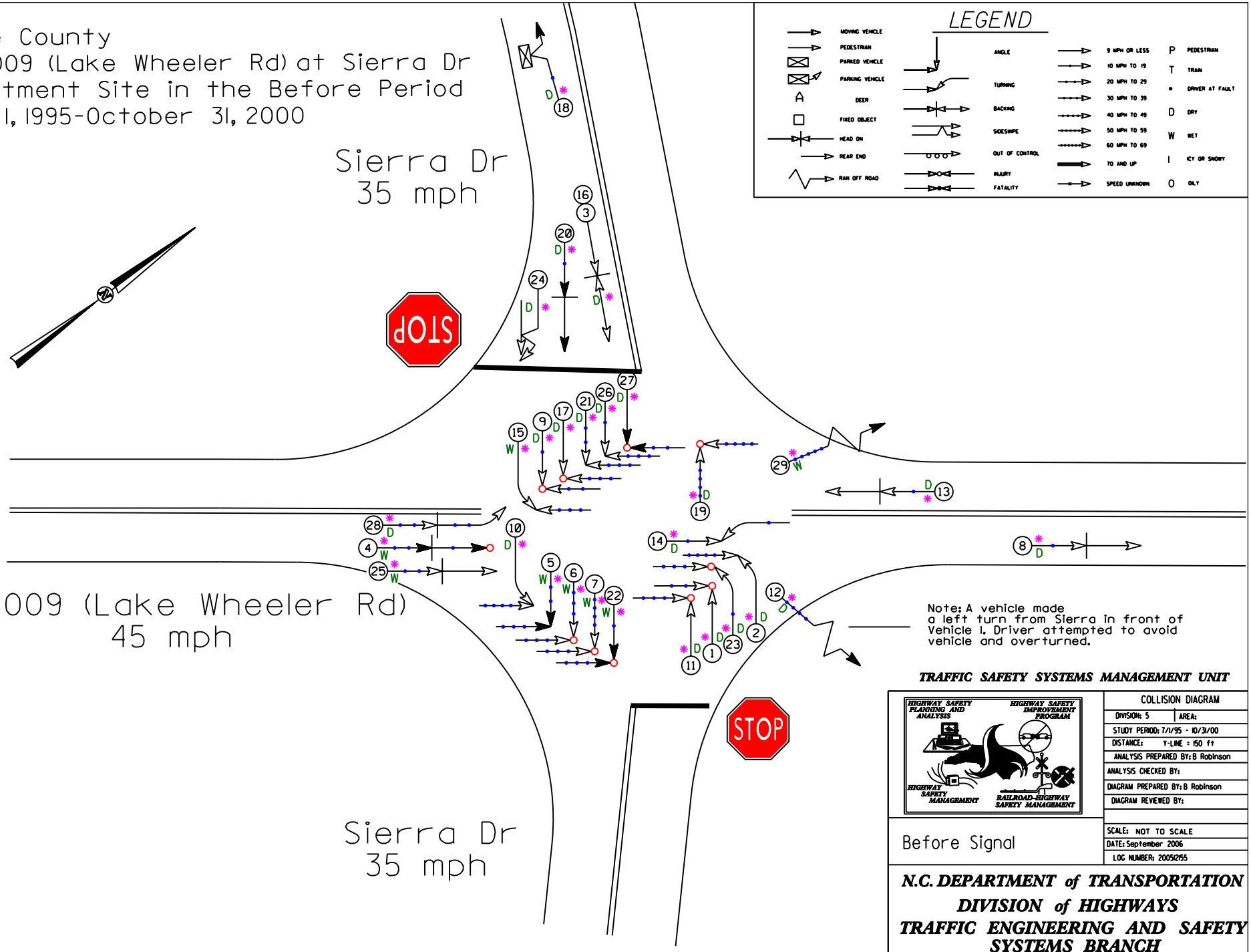
Looking Northeast on SR 1009 (Lake Wheeler Rd)

Looking Southwest on SR 1009 (Lake Wheeler Rd)

Looking Northwest on Sierra Dr

Looking Southeast on Sierra Dr

Wake County
SR 1009 (Lake Wheeler Rd) at Sierra Dr
Treatment Site in the Before Period
July 1, 1995-October 31, 2000



Note: A vehicle made a left turn from Sierra in front of Vehicle 1. Driver attempted to avoid vehicle and overturned.

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 7/1/95 - 10/31/00	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: B Robinson	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: B Robinson	
DIAGRAM REVIEWED BY:	
Before Signal	SCALE: NOT TO SCALE
	DATE: September 2006
	LOG NUMBER: 20051255

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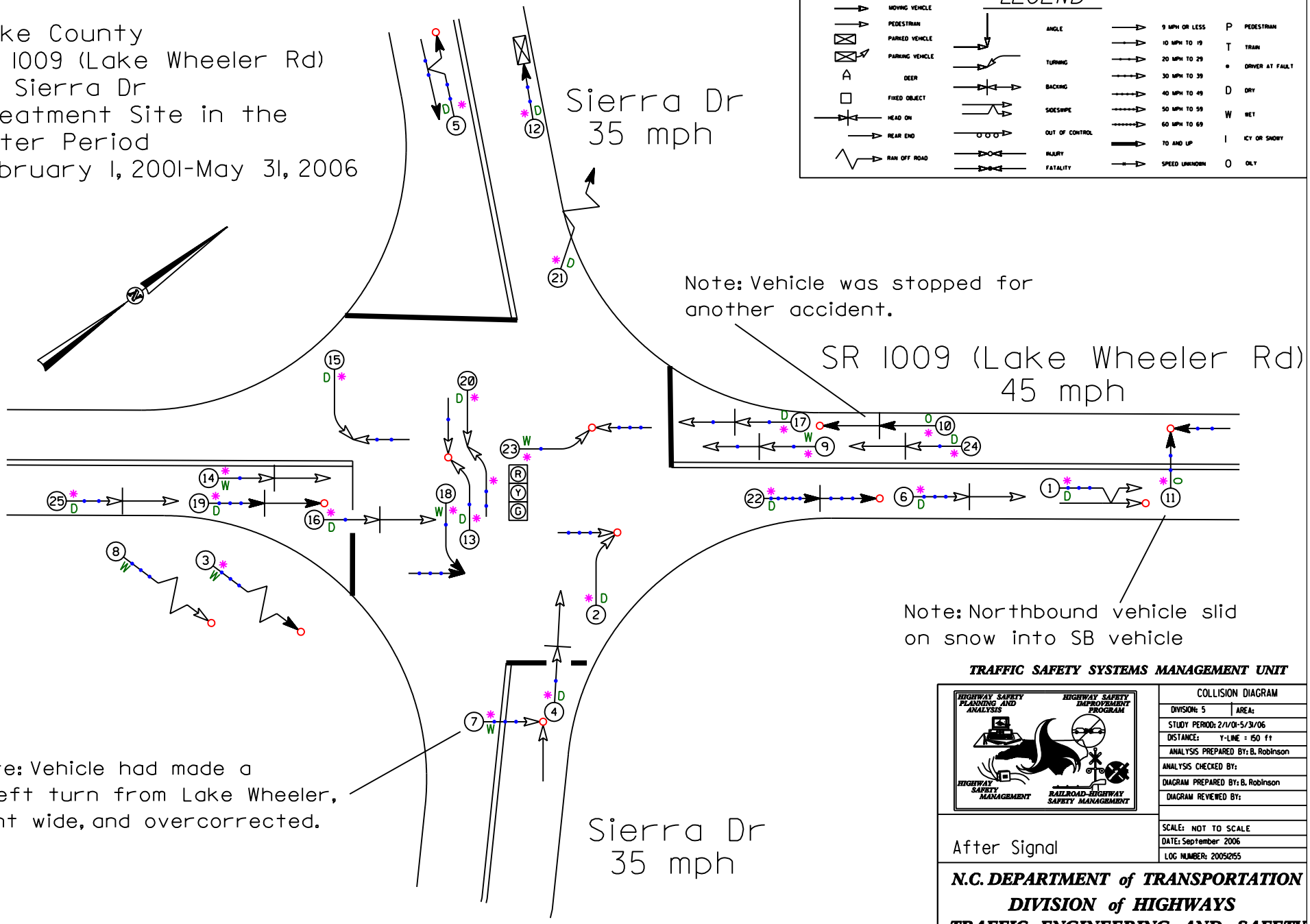
Wake County
SR 1009 (Lake Wheeler Rd)
at Sierra Dr
Treatment Site in the
After Period
February 1, 2001-May 31, 2006



Note: Vehicle was stopped for another accident.

Note: Northbound vehicle slid on snow into SB vehicle

Note: Vehicle had made a a left turn from Lake Wheeler, went wide, and overcorrected.

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS / HIGHWAY SAFETY IMPROVEMENT PROGRAM / HIGHWAY SAFETY MANAGEMENT / RAILROAD-HIGHWAY SAFETY MANAGEMENT	COLLISION DIAGRAM
	DIVISION: 5 AREA:
	STUDY PERIOD: 2/1/01-5/31/06
	DISTANCE: Y-LINE = 150 ft
	ANALYSIS PREPARED BY: B. Robinson
	ANALYSIS CHECKED BY:
	DIAGRAM PREPARED BY: B. Robinson
	DIAGRAM REVIEWED BY:
After Signal	SCALE: NOT TO SCALE
	DATE: September 2006
	LOG NUMBER: 20052155

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH